

X-Ray Photoelectron Spectroscopy Study Of Copper Sodium Silicate Glass Surfaces

Mekki, A; Holland, D; McConville, CF

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King Fahd University of Petroleum & Minerals

<http://www.kfupm.edu.sa>

Summary

Copper oxide-containing, sodium silicate glasses with composition $(0.70-x)\text{SiO}_2-0.30\text{Na}_2\text{O}-x\text{CuO}$ (x in the range 0-0.2), were prepared by conventional melting and casting. The surface structure has been investigated by X-ray photoelectron spectroscopy. Evidence for the presence of copper in the Cu^+ state for glasses with x less than or equal to 0.14, and for both oxidation states (Cu^+ and Cu^{2+}) in the glass where $x = 0.18$, has been obtained from the "shake up" satellite structure of the Cu 2p core level spectra. A deconvolution procedure has been undertaken to determine quantitatively the $[\text{Cu}^{2+}]/[\text{Cu-total}]$ ratio. The non-bridging oxygen content, obtained from the deconvolution of the O 1s core level spectra, increases with increasing copper oxide content indicating that copper acts as a network modifier. The O 1s spectra were modelled in such a way as to separate the contributions from SiOCu and SiONa to the non-bridging oxygen signal. (C) 1997 Elsevier Science B.V.

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